CLAIMS

What is claimed is:

1. A method of providing transparent local area network (LAN) service in a ring network, comprising:

allocating respective proportions of data transmission capacity of the ring to different closed user groups (CUGs), each closed user group including a corresponding plurality of LAN clients of the transparent LAN service; and

at each of a plurality of network devices attached to the ring:

(1) monitoring the use of a connected segment of the ring for both pass-through and locally-generated traffic by the LAN clients on a per-CUG basis; and

(2) upon detecting that use of the connected segment for a given CUG is approaching the proportion of ring data transmission capacity allocated to the CUG, selecting an active one of the LAN clients of the CUG and sending a throttle message to the selected LAN client, the throttle message indicating that the LAN client is to reduce its data transmission rate.

2. A method according to claim 1, wherein the monitoring for each CUG comprises:

maintaining a set of buffers for traffic of the CUG and removing traffic from the buffers at a predetermined aggregate rate corresponding to the proportion of ring data transmission capacity allocated to the CUG; and

continually determining whether the occupancy of the buffers exceeds a predetermined threshold.

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3. A method according to claim 1, wherein the selecting for each CUG comprises:

maintaining a rate cache identifying active sending ones of the LAN clients of the CUG and corresponding rates at which the active LAN clients are sending traffic; and

selecting from among the active LAN clients identified in the rate cache according to a predetermined selection criteria.

4. A method according to claim 3, wherein the predetermined selection criteria includes successively rotating among the identified active LAN clients.

5. A method according to claim 1, wherein the CUGs are first-type CUGs receiving guaranteed delivery service, and further comprising, at each of the plurality of network devices:

monitoring the fullness of a set of buffers for traffic of second-type CUGs receiving best-effort service; and

upon detecting that the fullness of the buffers exceeds a predetermined threshold, selecting an active one of the LAN clients of one of the second-type CUGs and sending a throttle message to the selected LAN client, the throttle message indicating that the LAN client is to reduce its data transmission rate.

6. A method according to claim 1, wherein the throttle message comprises a pause message, and wherein the selected LAN client responds to the pause message by temporarily ceasing its data transmission.

7. A method according to claim 1, wherein the throttle message indicating that the selected LAN client is to reduce its transmission rate by a predetermined amount specified by the throttle message.

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8. A network providing transparent local area network (LAN) service, the network comprising a plurality of nodes interconnected in a ring, the ring having an overall data transmission capacity divided into respective proportions allocated to different closed user groups (CUGs), each closed user group including a corresponding plurality of LAN clients of the transparent LAN service, each of the nodes being operative to (1) monitor the use of a connected segment of the ring for both pass-through and locally-generated traffic by the LAN clients on a per-CUG basis, and (2) upon detecting that use of the connected segment for a given CUG is approaching the proportion of ring data transmission capacity allocated to the CUG, select an active one of the LAN clients of the CUG and sending a throttle message to the selected LAN client, the throttle message indicating that the LAN client is to reduce its data transmission rate.

9. A network according to claim 8, wherein each node includes a plurality of sets of buffers, each set used to buffer the traffic of a corresponding one of the CUGs, and is further operative when monitoring segment use for each CUG to: (1) remove traffic from the buffers of the CUG at a predetermined aggregate rate corresponding to the proportion of ring data transmission capacity allocated to the CUG, and (2) continually determine whether the occupancy of the buffers exceeds a predetermined threshold.

10. A network according to claim 8, wherein each node includes a plurality of rate caches, each rate cache identifying active sending ones of the LAN clients of a corresponding CUG and corresponding rates at which the active LAN clients are sending traffic, and wherein the node is operative when selecting a LAN client for receiving a throttle message to select from among the

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active LAN clients identified in the rate cache according to a predetermined selection criteria.

11. A network according to claim 10, wherein the predetermined selection criteria includes successively rotating among the identified active LAN clients.

12. A network according to claim 8, wherein the CUGs are first-type CUGs receiving guaranteed delivery service, and wherein each of the nodes is further operative to (1) monitor the fullness of a set of buffers for traffic of second-type CUGs receiving best-effort service, and (2) upon detecting that the fullness of the buffers exceeds a predetermined threshold, select an active one of the LAN clients of one of the second-type CUGs and send a throttle message to the selected LAN client, the throttle message indicating that the LAN client is to reduce its data transmission rate.

13. A network according to claim 8, wherein the throttle message comprises a pause message, and wherein the selected LAN client responds to the pause message by temporarily ceasing its data transmission.

14. A method according to claim 8, wherein the throttle message indicating that the selected LAN client is to reduce its transmission rate by a predetermined amount specified by the throttle message.

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